

Institute of Chemical Technology, Prague

Vysoká škola chemicko-technologická v Praze

Abbreviation in Czech: VŠCHT Praha

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History

- The Institute of Chemical Technology, Prague is the direct successor to the Chemistry Department of the Prague Polytechnic, officially called the Royal Czech Polytechnical Institute, founded by Emperor Francis II in 1803. Courses in the two departments of the Prague Polytechnic, mathematics and chemistry, began in 1806. As of the academic year 1864-65, parallel courses in chemistry conducted in Czech and in German began at the Prague Polytechnic. The reorganisation of the Prague Polytechnic in 1920 resulted in the transformation of its chemistry department into the School of Chemical Technology, one of the seven faculties of the Czech Technical University. A number of notable chemists have graduated from the School of Chemical Technology. For the Czech public, the best known is probably Professor Otto Wichterle, the inventor of contact lenses. Vlado Prelog, who graduated in 1928, was awarded the Nobel Prize in Chemistry in 1975, as a professor at the Swiss Federal Institute of Technology in Zurich, for his contribution to the stereochemistry of organic molecules and their reactions. Professor Josef Pašek, was awarded the Czech Head 2004 for the development of aniline production technology, realized at BC-MCHZ Ostrava, yearly production 150 thousand tons. The license was sold to the Japanese company Tosoh (which outbid international competitors, including DuPont).

On 21 June 1925, the foundation stone of the first building on the campus of the Czech Technical University was laid in Dejvice, in the presence of President T.G. Masaryk. The first building was designed for the School of Chemical Technology,

and still serves in this capacity. Courses were taught there from 1933 onwards. The School of Chemical Technology was detached from the Czech Technical University in 1952, and began its independent existence as the Institute of Chemical Technology, Prague (ICT).

Structure of the Institution

- **The Institute of Chemical Technology, Prague consists of four faculties:**

Faculty of Chemical Technology

- Research and development activities in the faculty are oriented on basic and applied research in chemistry, chemical technology and chemistry of materials (metallic, inorganic nonmetallic, polymeric and composite). The Faculty is an important partner for the Czech and foreign chemical and materials industry.

Main fields of research:

- New types of metal alloys, ceramic materials and polymers for use in construction;
- Bioceramics, bioglass and silicon rubbers for use in medicine;
- Corrosion and degradation of metallic, glass, ceramic and polymeric materials;
- Composite materials: optimising their properties and their resistance in a chemical environment;
- High-temperature superconductors, materials for optoelectronics and magnetic recording;
- Structural and phase analysis of materials;
- Physico-chemical modification of the surface of solid substances;
- Chemical stability of cultural monuments and works of art, and methods for protecting them;
- Environmental aspects in the manufacture of materials, treatment of chemical wastes;
- Design and optimisation of chemical and electrochemical reactors;
- Reaction kinetics, catalysis and new types of catalysts;
- Modelling of reactors and simulation of chemical technology processes;
- Synthesis of special substances, in particular substances for the pharmaceutical and cosmetics industries;
- Glass melting processes and optimisation of related technology, analytics of gases in glass melts;
- Preparation and characterization of polymers, evaluation of additives, composition of rubber mixtures, analytics of polymers, biologically degradable polymers;
- Solving problems in the polymorphism of substances.

Faculty of Environmental Technology

- Research and development activities in the faculty are based on its traditional orientation to fuel technology and water technology. In compliance with the latest trends, great emphasis is placed on environment-friendly technologies.

Main directions include:

- Petroleum processing and analytical evaluation;
- Environmental aspects of motor fuels production and use, alternative motor fuels;
- Lubricants, engine oils and tribodiagnosics, biodegradable lubricants;
- Transport, storage and distribution of natural gas and other gaseous fuels;
- Purification of waste gases, reduction of emissions from combustion of gaseous fuels;

- Energetic utilisation of biomass and wastes;
- Development of coal-based adsorption materials;
- Harmful substances in the environment, monitoring the emissions of organic compounds and heavy metals in the atmosphere;
- Biotechnological methods of wastewater treatment and sludge processing;
- Biological degradation of xenobiotic substances in the environment;
- Hydro- and microbiological evaluation of water quality;
- Drinking water quality;
- Desalination and treatment of water for power engineering and other branches of industry;
- Selective removal of harmful substances from water using ion exchangers;
- Corrosion and corrosion stress inhibition, evaluation of materials in power engineering and other branches of industry;
- Development of progressive analytical and eco-toxicological procedures for assessment of polluted soils;
- Development of physical and chemical processes for treatment of polluted soils and solid wastes;
- Theoretical modelling of pollutant behaviour in solid contaminated matrices.

Faculty of Food and Biochemical Technology

- Research and development activities in the faculty embrace all fields of food chemistry, food technology and biotechnology. Emphasis is placed on improving food quality and ensuring optimum nutrition, on introducing progressive engineering processes aimed at better utilization of raw materials and waste, and on biochemical, microbiological and molecular genetic studies.

Main directions include:

- Hygienic-toxicological quality of food, contaminants and the HACCP system;
- Nutritional and sensory quality of food;
- Technological quality control, advanced analytical methods, computer image analysis, physical properties of food, detection of GMO in food, immunoanalysis;
- Technological quality of meat, cereal, sugar, chocolate, milk and dairy products, hop, beer and other food commodities;
- Progressive engineering processes – membrane separation, biosorption, preparative chromatography, thermal and high pressure processes, bioengineering;
- New food packaging technologies;
- Process management, simulation, modeling and balance calculation;
- Renewable energy sources, biofuel from natural materials, better utilization of waste and by-products;
- Biomolecules, properties of glycoproteins, phospholipids and biologically active derivatives of carbohydrates;
- Protein structures and interactions for inhibition of virus assembly and therapeutic purposes;
- Microorganisms and plants in industrial and environmental technologies, microbial degradation of pollutants, sorption of heavy metals, development of new biodegrading substances;
- Gene engineering in biotechnologies, functional genomics, construction of microbial strains for food technologies, biodegradation processes, etc.

Faculty of Chemical Engineering

- Research and development activities in the faculty are focused on the complex field of chemical and process engineering, ranging from engineering experiments to computer modelling, analysis, measurement and management.

Main directions include:

- Chemical engineering reaction-transport systems: modelling and experimental verification of models;
- Modelling, simulation and control of processes and systems of chemical technology and biotechnology, information technology and engineering information systems in chemical processes and food technology;
- Nonlinear dynamics of chemical and biological systems;
- Thermodynamic, spectroscopic, and structural properties of environmentally important species, pure substances, methods for prediction and estimation, molecular modelling and computer simulation of thermodynamic properties;
- Thermodynamic characterization of the dissolution of organic substances in water in extended ranges of temperature and pressure, thermodynamic studies of the fluid-phase equilibria in systems of technological importance;
- Processes at interfaces and in membranes;
- Chemical, association and complexation equilibria, including interactions with biologically and environmentally important analytes, conformational study of molecules and their changes induced by interactions with biologically important molecules;
- Speciation analysis of biological samples, biospectroscopy, processing of multivariate signals, evaluation of mutual correlation.

The Institute also runs scientific, development and service centres and specialised facilities, such as halls of residence.

Organization of Studies

■ **All faculties of the Institute of Chemical Technology, Prague offer the following study programmes:**

- Three-year bachelor programmes (graduates are awarded the degree Bachelor, abbr. Bc.),
- Two-year continuing master programmes (for bachelors, starting in 2007; graduates are awarded the degree Engineer, abbr. Ing., which is equivalent to the degree Master of Science, MSc),
- Doctoral programmes (graduates are awarded the degree Doctor, abbr. Ph.D.).

The ICT has also been commissioned to provide supplementary courses to prepare students to become secondary school chemistry teachers. Three-year bachelor study programmes are completed by a state bachelor's examination and the presentation of a project to prepare qualified staff for food processing facilities, for the chemical and electrical engineering industries, for control and inspection institutions, commerce and state administration.

Two-year master study programmes are completed by a final state examination and the presentation of a diploma thesis. Graduates acquire a general engineering approach to solving problems in specific fields of specialisation.

Doctoral study programmes are based on individual study plans comprising lectures, examinations and a doctoral examination in the field of specialisation, and the systematic solution of a specific scientific problem, leading to the completion and defence of a doctoral thesis. Students wishing to study in Czech may apply for a scholarship from the funds of the ICT, or from other sources.

Students at the Institute of Chemical Technology (ICT), Prague, may choose to study

in English or in Czech. The ICT, Prague offers its students optional Czech language courses as part of their study programmes.

Research and Development

rtd@vscht.cz , www.ict-prague.eu

ICT Prague is a technical university, with creative and innovative scientific research and development work forming the basis of its educational activities. Research activities at ICT Prague embrace the fields of chemistry and chemical technology, materials engineering, food processing, biotechnology, biochemistry, microbiology, genetics, environmental technologies, chemical and process engineering, and economics.

Particular research priorities include:

- Catalytic processes in chemistry and chemical technology;
- Preparation and study of functional materials and materials technologies using micro-and nanoscopic methods;
- Modern procedures of treatment, processing and utilization of fuels;
- Theoretical fundamentals of food and biochemical technologies;
- Reaction-transport chemical engineering systems and their dynamic behaviour, modelling and control of chemical and biotechnological processes;
- Physicochemical methods of analysis and characterization of chemical systems and biosystems.

There are currently seven research centres at ICT Prague:

- Research Centre for Nanostructures Engineering;
- Center for Applied Genomics;
- Research Centre for Study of Extract Compounds of Barley and Hop;
- The Structure and Synthetic Applications of Transition Metal Complexes;
- Centre for Quasioptical Systems and Terahertz Spectroscopy;
- Regulation of Morphogenesis of Plant Cells and Organs;
- Center for Chemical Genetics.

The Department of Research and Development coordinates all activities in the field of research and development at ICT Prague. It provides information about grants offered at both national and international levels. It also handles problems relating to the protection of industrial and intellectual property, as well as all property rights of the Institute to inventions. In the field of teaching it is responsible for the management and control of PhD study programmes.

Central Library

ICT Prague has the most extensive collection of printed chemical books and journals in the Czech Republic, including those of historical importance. The fundamental source of information for all chemical disciplines, Chemical Abstracts, and the classic chemical "Handbücher", Beilstein and Gmelin, are available in printed form as a complete edition (CA until 1998), as well as in electronic form (CA no CD 1997).

The library also owns an outstanding collection of scientific periodicals, many of which date far back into the 19th century. The collection includes the first volumes of the major chemical journals at that time. Recently, this collection has been supplemented and extended by their electronic versions, which now covers full runs of many titles from their first volumes. The combined printed and electronic forms represent the broadest collection of scientific chemical journals in the Czech Republic, and is available not only to ICT staff and students but also to the wide chemical community.

Contact: <http://knihovna.vscht.cz>

Electronic sources of information – services for industry:

ICT Prague offers a number of services to the chemical industry and other related industries:

- Since 1991 it has formally acted as the Central Chemical Information Service in relation to the chemical industry;
- It maintains access to the largest worldwide database centre, STN International, as well as the Chemical Abstracts database and a number of other sources, including those relating to patents.
- It utilises its experience of working with both chemical and non-chemical sources of information, including a direct link to license-free academic sources;
- It provides consultation and solution services to projects concerned with building information systems in the industrial environment;
- It offers long-term cooperation, as well as solutions for ad-hoc requirements.

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Basic Statistical Data in Academic Year 2007/2008

■ Total number of students	3 973
Number of students of bachelor study programmes	2 333
Number of students of master study programmes	792
Number of students of doctoral study programmes	848
Number of foreign students	345
Total number of graduates in 2008	720
Total number of academic staff	658